

WASHINGTON

# SCIENCE TRENDS

HIGHLIGHTS

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Volume V, No. 11

November 28, 1960

## \* CATHODIC SHIP PROTECTION

The Navy is studying the effects of various galvanic anodes for the cathodic protection of its active ships. Various types of magnesium and zinc anodes have been tested, with results now available on the magnesium systems.

The examination of ships fitted with magnesium anodes -- some relatively small and coated with plastic, and some relatively large and uncoated -- reveal:

- ✓ Magnesium anodes have performed satisfactorily in protecting the underwater hulls of destroyers. Their performance is said to give weight to the advisability of employing galvanic anode systems for cathodically protecting the hulls of Navy ships up to and including destroyers.
- ✓ Either plastic-coated or uncoated magnesium anodes provide almost full protection to the underwater hull over a two-year period.
- ✓ By attaching coated magnesium anodes in addition to the number of uncoated ones required for initial protection, and by removing some of these coatings from time to time, as indicated by potential measurements, a service life of three years is "easily obtainable" from one installation.
- ✓ Rubber shields around uncoated anode arrays reduced the loss of excessive current to the adjacent hull area and helped to increase the life of the anodes. For a similar reason, all exposed metal fastenings of the anodes should be reduced to a minimum, the Navy says. Rubber shields appear to be unnecessary with coated anodes.

(R&D reported by L. J. Waldron and M. H. Peterson, Metallurgy Division, Physical Metallurgy Branch, U. S. Naval Research Laboratory, Washington 25, D. C.)

## \* HELP WANTED

Army Ordnance is currently looking for 515 civilian engineers in ten career fields, with salaries ranging from \$10,000 upwards. Nearly three hundred of these positions are with the Army Ballistic Missile Agency Redstone Arsenal, Huntsville, Alabama, which lost many of its employees to the National Aeronautics and Space Administration.

Ordnance has other jobs available throughout the country in its weapons, vehicle, guided missile, ammunition, and other programs.

Information can be obtained from Army Ordnance Technical Offices, located in various Ordnance installations, or at Army Ordnance Missile Command Placement Offices located in key cities.

\* SOVIET MINERALS

Studies by the U. S. Bureau of Mines indicate that minerals and fuels accounted for more than a third of the value of all Soviet exports during 1959 -- and that her growing strength in raw materials is being used as a weapon in the economic cold war.

Russia's mineral exports gained 14 percent in value over 1958 -- and were twice the 1955 value. Although the Soviets cut down on shipments of zinc, tin and aluminum to Free World countries there were substantial increases in solid and liquid fuels, iron ore, pig iron, rolled steel, manganese ore, chromite, asbestos, apatite concentrate and potash salts.

The United Kingdom appeared to particularly affected by Russia's economic whims. In 1958 the U. K. supplied over 70 percent of the ingot copper imported by Russia. The following year imports increased substantially but the U. K. supplied less than 25 percent of the total.

(The new report "The Foreign Mineral Trade of the U.S.S.R. in 1959-Mineral Trade Notes Supplement No. 60" can be obtained without charge by writing U. S. Bureau of Mines, Publications-Distribution Section, 4800 Forbes Avenue, Pittsburgh 13, Pa. Requests for this publication should specify its title and number.)

\* AIRCRAFT MODIFICATION

Federal Aviation Agency is establishing a new program to speed up certification of modified aircraft, widely used in business aviation. Such modifications require special "supplemental-type" certificates, a time-consuming project.

Under new program plans:

- ✓ Uniform interpretation of regulations will be encouraged. A special office is being established in Washington under a Chief Modification Engineer, and there will be improved data dissemination between FAA Regions.
- ✓ Increased Authority may be given to industry facilities under a new rating of "Approved Modification Station". Such stations would have authority to approve supplemental type certificates covering their modifications.
- ✓ Manufacturers will be urged to provide manuals to aid FAA field personnel in producing more rapid and uniform approval of changes; particularly for the new, small, high-performance business aircraft that have special interiors installed after they leave the factory.
- ✓ Industry will be asked to propose new regulations for large business aircraft; including a new special regulation pertaining to modifying transport-type aircraft for business use. Industry will also be expected to assist FAA by advance planning of modification operations, particularly when adequate scheduling of required tests must be arranged.

\* ELECTRONIC COMPONENT OUTPUT LEVELS OFF

New U. S. Department of Commerce figures indicate that shipments of electronic components leveled off during the second quarter of 1960. There was a decline in receiving tubes, transistors, capacitors and connectors during the period, but this was counterbalanced by increased shipments of diode and rectifiers, power and special purpose tubes, television picture tubes, transformers and quartz crystals. Shipments of other components continued at first quarter levels. For the first time since these data were collected, the Department notes, output of semiconductor devices failed to increase.

(Detailed breakdown in Announcement BD 60-204, available from Information Office, Business and Defense Services Administration, Washington 25, D. C.)

\* ASW MARKET

Here are key conclusions reached by the Electronic Industries Association "Task Force" on Antisubmarine Warfare, as released during the past week:

- ✓ The principal technical problems to be solved as a means of improving ASW capability, lie in the area of long range detection and classification of submarines. Basic research in oceanography is implied to make such technical advances.
- ✓ The available electronics market in ASW is fairly small, about \$185 million out of the \$240 million associated with USW developments. The importance of the problem indicates growth through the mid-60's as the electronic portion of the overall USW effort reaches the \$400 million level and the percentage devoted to ASW reaches 80 to 85 percent.
- ✓ Opportunities in the key RDT&E area of detection and classification will be concentrated in better sensors, improved data processing, and command and decision making equipment.
- ✓ In addition to work in detection and classification, other areas where electronics can make major contributions are underwater and interface communications, training devices and simulators, countermeasures and decoys. Submarine warning and alarm systems and independent merchant ship protection offer large potential markets for effective, inexpensive devices.
- ✓ Because of the nature of the ASW problem, it does not appear that there will be a trend toward integrated systems comparable to that experienced in the missile and aircraft markets, at least for the foreseeable future.
- ✓ The most significant fact about the ASW market is its explosive potential for growth if a scientific breakthrough, especially in the field of sensors, should occur. "Sensors" is used here in the broad sense to include acoustic and non-acoustic devices not limited only to detection. The number of merchant ships, warships, submarines, and aircraft susceptible to use of a new device would constitute a large and rewarding market. The continued operation of hundreds of submarines by Communist navies reinforces the continued demand for large ASW forces.

(Single Copies of the complete 15-page report are now available on a complimentary basis. Write Information Office, Electronic Industries Association, Attn: Mr. W. Hepner, 1721 DeSales Street, N. W., Washington 6, D. C.

\* POWER INFORMATION CENTER

Organizations working on energy conversion and related systems are being invited to report their findings to the recently established Power Information Center, established under Government contract.

The Center disseminates information on government-sponsored work on a "need-to-know" basis. Project and status sheets are issued for the following categories: electrochemical; photoelectric; electromagnetic; mechanical; thermoelectric; and miscellaneous. Companies desiring to be placed on the mailing list for selective information service should specify the area of interest for which information is desired, and make application through the service for which they are working.

(For further information, write Power Information Center, 103 Moore School Building, University of Pennsylvania, 200 South 33rd Street, Philadelphia 4, Pa.)

## TECHNICAL TRENDS

- A complete listing of contracts let by the National Aeronautics and Space Administration and its various Research Centers during July, August and September is available upon request from Information Office, NASA, 1520 H Street, N. W., Washington 25, D. C. Ask for Release No. 60-298. ✓✓ The Air Force is interested in learning more about the phenomenon known as ball lightning, particularly as observed by pilots and other flying personnel. Write to Dr. Edmond Dewan, Air Force Cambridge Research Laboratories, L. G. Hanscom Field, Bedford, Mass. ✓✓ Details of studies of the physical properties of cross-linked natural rubber are available from the National Bureau of Standards, Office of Technical Information, Washington 25, D. C.
- The Federal Power Commission, Washington 25, D. C. has established a new Division of Economics to assist the Commission through studies covering natural gas and other energy source market trends. ✓✓ Abe Hyatt will become Director of the Program Planning and Evaluation Office of NASA effective December 1. He succeeds Homer J. Stewart who returns to the California Institute of Technology. ✓✓ Army Research and Development Reservists may now obtain retirement point credits by translating foreign scientific and technical material. ✓✓ Republic Aviation Corporation has received a one-year study contract from Wright Air Development Division, U. S. Air Force, to search for solutions to welding problems that occur in connection with high strength iron and nickel-based alloys. ✓✓ The Information Office, U. S. Atomic Energy Commission, Washington 25, D. C. has available details on amounts of uranium concentrates to be purchased by the U. S. under contracts with domestic uranium companies. Ask for Release No. C-227.
- The Supply Office, Naval Ordnance Laboratory, White Oak, Silver Spring, Maryland expects to buy an infrared automatic acquisition and tracking unit to be installed in KC-135 type aircraft. The device is to be used in the study of infrared properties of missiles at various testing ranges. ✓✓ Hughes Aircraft Company has won a \$2.5 million contract for development of electronic improvements for automatic control systems in the F-101B, F-102A and F-106A all-weather interceptor aircraft. ✓✓ A report on laboratory-scale experiments in recovering lithium and borax from mine tailings is available for inspection at U. S. Bureau of Mines Libraries in Washington, D. C.; San Francisco, Calif.; and Reno, Nevada. ✓✓ The Federal Communications Commission has agreed to consider an application from Hughes Aircraft Company for experimental use of radio-controlled robot devices termed "Mobots" to be used in areas too dangerous for humans. However, the Commission has turned down an application for exclusive use of 100 Mc of microwave space in the 13000-35000 Mc band "at this time."
- A report, presumably by the Central Intelligence Agency, covers Communist China's efforts in the field of weather control. It is now available as Pub. 60-21921 from OTS, U. S. Department of Commerce, Washington 25, D. C. Price 50 Cents. ✓✓ New ceramic insulating material has been developed by the General Electric Company for the Air Force employing an inorganic sheet material consisting of a flake mica-glass cloth composite bonded together with an inorganic cement. For encapsulating, a ceramic cement is used consisting of equal parts of magnesium oxide and glass frit, with a binder of aluminum phosphate in phosphoric acid.
- Maj. Gen. Robert H. Booth, now at Fort George G. Meade, Maryland becomes Chief, Defense Atomic Support Agency, Washington 25, D. C. in January. ✓✓ The Base Procurement Branch, Wright Patterson Air Force Base, Ohio is interested in design, development and fabrication of a temperature control device to be used with special clothing worn by missile fuel handlers. ✓✓ Latest figures on Japanese photographic production are available from Information Office, Business and Defense Services Administration, Washington 25, D. C. Ask for Announcement BD-60-200.



## RESEARCH CHECKLIST

- TESTING GUIDED MISSILE FUZES: Army researchers have proposed use of modified bombs with parachute recovery for determination of the burst-height accuracy of guided missile fuzes. Because of instrumentation problems with long range missiles it is often difficult to determine whether fuzes are functioning with required accuracy. The fuzes would be dropped in modified bombs over instrumented areas. A barometric switch would activate a thermal battery, and arm spotting charges. A drag chute section would be disconnected for recovery.

(Proposal reported by D. A. Worcester and R. J. Gath, Diamond Ordnance Fuze Laboratory, U. S. Army, Washington 25, D. C. Available as Technical Report 808, DOFL, from Library of Congress, Photoduplication Section, Washington 25, D. C.)

- NEW ACETYLENE PLANT: The Army is testing a new mobile acetylene plant which uses JP-4 jet fuel as a raw material rather than calcium carbide which is potentially hazardous to transport and store. The plants are used in the field production of acetylene for cutting and welding. The process developed for the Army involves the thermal cracking of the jet fuel at high temperatures to produce a raw gas stream containing approximately 15 percent acetylene. This stream is subsequently purified to produce a 95 percent acetylene product which is compressed and loaded into cylinders. Design production capacity is 500 standard cubic feet per hour.

(R&D by Institute of Gas Technology, Chicago, Illinois, reported by Technical Liaison Office, U. S. Army Engineer Research and Development Laboratories, Fort Belvoir, Virginia.)

- INSULATING LIQUID HYDROGEN: Studies of liquid-hydrogen fueled rockets and spacecraft indicate the need for insulation of fuel tanks while on the ground, and in atmospheric flight. Without insulation air will continually condense on metal tank walls, causing heat flow which in turn causes rapid boiling of the hydrogen, large fuel venting losses and/or tank pressure rises. Studies by NASA indicate that insulation for such tanks must be lightweight, while possessing enough strength to withstand aerodynamic forces; should be slightly flexible at cryogenic temperatures; should have and retain a low thermal conductivity; should retain enough stiffness at high temperatures so that nothing worse than slow, orderly surface ablation would result from aerodynamic heating.

Experiments indicate that commercial composition corkboard best meets these requirements. Two other materials may be suitable but structural integrity at both high and low temperatures poses problems. These are phenolic honeycomb filled with low-density insulation sandwiched between thin glass-cloth facings, and balsa wood.

(For details write NASA, ATTN: Code BID, Washington 25, D. C. for NASA Technical Note D-476.)

- GROWING SEMICONDUCTOR CRYSTALS: Research for the Air Force at Wayne State University is said to indicate that crucible free arc image crystal growing techniques lend themselves to the production of relatively large, high quality crystals of certain semiconductor materials, such as silicon. Radiant power was used for heating the materials; a technique which is said to have a number of advantages.

(Technical Report of March 1, 1960 now available through military channels or at \$2.50 through OTS, U. S. Department of Commerce, Washington 25, D. C. Ask for AFOSR TN 60-312.)

## P U B L I C A T I O N      C H E C K L I S T

- ☐ LOW COST AUTOMATION, a report on projects for stimulating advanced mechanization in small and medium sized European manufacturing plants. The concept of "Low Cost Automation" does not include feedback mechanisms but does include simple pneumatic, electric, hydraulic and mechanical components. Single Copies Free. (Write Publications Office, European Productivity Agency, 3 rue Andre Pascal, Paris XVI, France, for Final Report P382/x.)
- ☐ PARAWING RESEARCH, a technical report on exploratory studies of a Parawing as a high-lift device for aircraft. (SCIENCE TRENDS, November 21, 1960.) Single Copies Free. (Write National Aeronautics and Space Administration, 1520 H Street, N. W. Washington 25, D. C. ATTN: Code BID for NASA Technical Note D-629.)
- ☐ FUNDS FOR RESEARCH AND DEVELOPMENT IN INDUSTRY, a new report covering the year 1957 showing that funds for R&D in manufacturing and most other nonagricultural industries totaled \$7.2 billion. One of the most detailed studies ever published with many industry-by-industry breakdowns. 119 Pages. 65 Cents. (Write Superintendent of Documents, Government Printing Office, Washington 25, D. C. for Publication NSF 60-49.)
- ☐ MISSILES, ROCKETS AND SPACE VEHICLES, an Army Bibliography of the literature published during the last part of 1959 and the first half of 1960 on missiles, rockets and space vehicles. 81 Pages. \$1. (Write Superintendent of Documents, Government Printing Office, Washington 25, D. C. for Publication D 101.22:70-5-7.)
- ☐ U. S. EARTHQUAKES, 1958, a summary of earthquake activity in the U. S. and regions under its jurisdiction for the calendar year 1958. Just published. 76 Pages. 40 Cents. (Write Superintendent of Documents, Government Printing Office, Washington 25, D. C. for Publication C 4.25/2:958.)
- ☐ NAVY DIVING MANUAL, a consolidated reprint of material previously sold on a subscription basis reflecting new developments and current procedures in the diving field. 456 Pages. \$3.25. (Write Superintendent of Documents, Government Printing Office, Washington 25, D. C. for Publication No. D 211.6/2:D 64 rep.)
- ☐ UNITIZATION IN MARINE TRANSPORTATION, a selective bibliography of studies and articles on the unitization of maritime general cargo. Entries are listed under a number of categories such as Ship Design, Transfer Devices and Systems, and Rail and Truck Unitized Services. 44 Pages. \$1. (Write Printing and Publishing Office, National Academy of Sciences, 2101 Constitution Avenue, Washington 25, D. C. for Publication No. 795.)
- ☐ FORECASTING SCIENTIFIC MANPOWER, a report on a seminar held recently in The Hague, including papers on future needs and the educational facilities needed to fulfill them. Single Copies Free. (Write Information Division, OEEC, Chateau de la Muette, rue Andre Pascal, Paris XVI, France.)
- ☐ HIGH ENERGY RADIATION, a report by an international panel of physicists on dose distribution of high energy radiation in radiotherapy. Will be available in the near future. (Write Department of Research and Isotopes, International Atomic Energy Agency, Vienna 1, Karntnerring II, Austria, for Report, Panel on Physical Data on Dose Distribution of High Energy Radiation.)

Research and Development Directory

\* DEPARTMENT OF THE NAVY

Organizations interested in research and development contracts with the Navy or subcontracts with Navy suppliers may obtain information on current opportunities from the 27 offices of the Inspectors of Naval Material, (INSMAT) located throughout the United States.

Small business organizations calling on the Navy in Washington may do well to contact:

Mr. I. E. Peterson  
SBA Representative in Charge  
Washington Procurement Center  
Room 1531, Main Navy Bldg.  
Washington 25, D. C.

Telephone: OXford 6-6691  
OXford 6-2852

and/or

Office of Small Business  
U. S. Navy  
Room B-205, Main Navy Bldg.  
Washington 25, D. C.

Telephone: OXford 6-6053

Contact may also be made at the various technical offices:

Ø BUREAU OF NAVAL WEAPONS

Interests- Airframes, engines, guided missiles, instrumentation systems, electronic and radar systems; ground support equipment for aircraft and guided missiles; ammunition; and related research and development activities.

RESEARCH, DEVELOPMENT TEST  
AND EVALUATION

Capt. P. F. Bedell, Executive Dir.  
Room 2W67, W Building  
18th and Constitution Avenue  
Washington 25, D. C.

Telephone: OXford 6-3344

Small Business Specialist:  
John F. Lenahan  
Room O310, Main Navy Bldg.  
Washington 25, D. C.

Telephone: OXford 6-4972

Research and Engineering Officer, Room 2W88, W Building  
Aircraft Officer, Room 2W61, W Building  
Missile Officer, Room 2W50, W Building  
ASW Officer, Room 2149, Mun. Building  
Ship Installations Officer, Room 3341, Main Navy Building  
Astronautics Officer, Room 3716, Main Navy Building

SPECIAL PROJECTS OFFICER

To coordinate Polaris submarine development.

Technical Director  
Room 3204, Munitions Building  
Washington 25, D. C.

Telephone: OXford 6-7111

Ø NAVAL WEAPONS PLANT

Interests - Missile launching systems, development of prototypes of new weapons of all types.

Capt. C. E. Briner, Superintendent  
Building 200  
8th and M Streets, S. E.  
Washington 25, D. C.

Telephone: LIncoln 7-5700, Ext. 2000.

Research and Development Directory

Ø BUREAU OF SHIPS

Interests - Ship design, engineering services, fuels and lubricants, chemistry, metals and metallurgy, elastomers, textile and safety equipment, wood products, plastics, ceramics and dielectrics, coatings and preservation, noise vibration and shock, electronic equipment and components, and hull and machinery components.

BUREAU FOR RESEARCH & DEVELOPMENT

Capt. Edward J. Fahy, Chief  
Room 3020, Main Navy Building  
Washington 25, D. C.

Telephone: OXford 6-3240

Small Business Specialist:

M. Chemsak  
Room 1525, Main Navy Building  
Washington 25, D. C.

Telephone: OXford 6-3695

Laboratory Management Division, Room 3007, Main Navy Building  
Planning Division, Room 3010, Main Navy Building  
Applied Sciences Division, Room 3014, Main Navy Building  
Advanced Concepts Division, Room 3012, Main Navy Building  
R & D Warfare Systems Division, Room 3203, Main Navy Building  
Ocean Area Surveillance Division, Room 3203, Main Navy Building

Ø OFFICE OF NAVAL RESEARCH (Basic Research)

Building T-3  
17<sup>th</sup> St. & Constitution Ave., N. W.  
Washington 25, D. C.

Telephone: OXford 6-1853

Small Business Specialist:

L. O. Lincoln  
Room 2804, Building T-3  
Washington 25, D. C.

Telephone: OXford 6-6650

✓ NAVAL RESEARCH GROUP

Dr. S. Silverman, Director  
Room 2052

Telephone: OXford 6-2135

EARTH SCIENCES DIVISION, Room 2034

Acoustics, Geography, Geophysics, Field Problems.

MATERIAL SCIENCES DIVISION, Room 2042A

Metallurgy, Chemistry, Propulsion Chemistry, Power.

PHYSICAL SCIENCES DIVISION, Room 2052

Physics, Nuclear Physics, Electronics.

MATHEMATICAL SCIENCES DIVISION, Room 2719

Mathematics, Logistics and Mathematical Statistics, Information Systems, Fluid Dynamics, Structural Mechanics.

BIOLOGICAL SCIENCES DIVISION, Room 2063

Physiology, Biochemistry, Microbiology, Medicine and Dentistry, Biology.

PSYCHOLOGICAL SCIENCES DIVISION, Room 2038

Group, Physiological and Engineering Psychology, Personnel and Training.

✓ NAVAL APPLICATIONS GROUP

Air, Surface and Amphibious, Undersea.

Capt. W. G. Jackson, Room 2062A

Telephone: OXford 6-1579

✓ NAVAL ANALYSIS GROUP

Advanced Planning, Systems Analysis, External Studies.

Dr. J. D. Wilkes, Room 2046

Telephone: OXford 6-3567



